

WHAT IS CLAIMED IS:

1. A laminated strength-reinforced window assembly comprising:

a sheet of strength-reinforced transparent material having a tensile strength value, an impact resistance value, an environmental resistance value, an upper sealing surface and a lower sealing surface;
the upper sealing surface being disposed on the upper side of the strength-reinforced sheet;
the lower sealing surface being disposed on the lower side of the strength-reinforced sheet;

a first and a second transparent windowpane sheets, each windowpane sheet having a respective tensile strength value, a respective impact resistance value and a respective environmental resistance value, the first windowpane sheet being disposed over at least a part of the upper sealing surface and the second windowpane sheet being disposed under at least a part of the lower sealing surface;

at least one of the tensile strength value, the impact resistance value and the environmental resistance value of the strength-reinforced material being significantly greater than the corresponding value of one of the first and second windowpanes; and

the first and second transparent windowpane sheets being each hermetically bonded to the sheet of strength-reinforced material without non-hermetic adhesives to form a continuous hermetic joint therebetween.

2. A laminated strength-reinforced window assembly in accordance with claim 1, wherein the hermetic bonds between the strength-reinforced sheet and the first and second transparent windowpane sheets are diffusion bonds.

3. A laminated strength-reinforced window assembly in accordance with claim 2, further comprising:

an interlayer formed of a material different from the material of the strength-reinforced sheet and the material of either windowpane sheet, the interlayer being disposed between the sealing surface of the strength-

5 reinforced sheet and at least one of the windowpane sheets prior to diffusion bonding and being incorporated into the hermetic joint after bonding.

4. A laminated strength-reinforced window assembly in accordance with claim 2, wherein the material of the first windowpane sheet is different from the material of the second windowpane sheet.

5. A window unit for installation in a building, comprising:
a unit frame adapted for installation into the rough-in framing structure of a building during construction;
and
at least one laminated strength-reinforced window assembly in accordance with claim 1, the window
5 assembly being mounted into the unit frame.

6. A window unit for installation in a building, comprising:
a unit frame adapted for installation into the finished structure of a building after construction; and
at least one laminated strength-reinforced window assembly in accordance with claim 1, the window
assembly being mounted into the unit frame.

7. A window unit for installation in a vehicle, comprising:
a unit frame adapted for installation into the structure of the vehicle during initial assembly; and
at least one laminated strength-reinforced window assembly in accordance with claim 1, the window
assembly being mounted into the unit frame.

8. A window unit for installation in a vehicle, comprising:
a unit frame adapted for field installation into the finished structure of the vehicle after initial assembly;
and
at least one laminated strength-reinforced window assembly in accordance with claim 1, the window
5 assembly being mounted into the unit frame.

9. A laminated strength-reinforced window assembly comprising:

n sheet(s) of strength-reinforcing material, where $n \geq 1$, each sheet of strength-reinforcing material having a tensile strength value, an impact resistance value, an environmental resistance value, an upper sealing surface and a lower sealing surface;

10 $(n + 1)$ transparent windowpane sheets, each windowpane sheet having a respective tensile strength value, a respective impact resistance value and a respective environmental resistance value, the windowpane sheets being interleaved with the sheet(s) of strength-reinforcing material such that one sheet of strength-reinforcing material lies against each consecutive windowpane sheet, the sheet of strength-reinforcing material being disposed to have at least a part of the upper sealing
15 surface overlapping one of the adjacent windowpane sheets, and at least a part of the lower sealing surface overlapping the other adjacent windowpane sheet;

at least one of the tensile strength value, the impact resistance value and the environmental resistance value of each sheet of strength-reinforced material being significantly greater than the corresponding value of one of the directly adjacent windowpane sheets; and

20 all of the windowpane sheets being hermetically bonded to the adjacent sheet(s) of strength-reinforcing material without non-hermetic adhesives.

10. A laminated strength-reinforced window assembly in accordance with claim 9, wherein the hermetic bonds between the strength-reinforced sheet(s) and the windowpane sheets are diffusion bonds.

11. A laminated strength-reinforced window assembly in accordance with claim 9, wherein at least two of the transparent windowpane sheets are formed of different materials.

12. A laminated strength-reinforced window assembly in accordance with claim 9, wherein:
 $n \geq 2$; and
at least two of the sheets of strength-reinforcing material are formed of different materials.

13. A method for producing laminated strength-reinforced window assembly, comprising the following steps:

providing a sheet of strength-reinforced transparent material having an upper sealing surface and a lower sealing surface, the upper sealing surface being disposed on the upper side of the strength-reinforced sheet, and the lower sealing surface being disposed on the lower side of the strength-reinforced sheet;

providing a first transparent windowpane sheet and a second transparent windowpane sheet;

positioning the first windowpane sheet against at least a part of the upper sealing surface, the overlap between them defining an upper junction, and positioning the second windowpane sheet against at least a part of the lower sealing surface, the overlap between them defining a lower junction;

pressing the windowpane sheets against the sheet of strength-reinforced material with sufficient force to produce a predetermined contact pressure throughout the upper and lower junctions;

heating the junctions to produce a predetermined temperature throughout the junctions; and

maintaining the predetermined contact pressure and the predetermined temperature until a diffusion bond is formed between the windowpane sheets and the sheet of strength-reinforced material throughout the junction.

14. A method in accordance with claim 13, wherein the step of pressing the windowpane sheets against the sheet of strength-reinforced material is performed before the step of heating the junctions.

15. A method in accordance with claim 13, wherein the step of heating the junctions is performed before the step of pressing the windowpane sheets against the sheet of strength-reinforced material.

16. A method in accordance with claim 13 wherein the steps of pressing the windowpane sheets against the sheet of strength-reinforced material and of heating the junctions are performed simultaneously.

17. A method in accordance with claim 13, wherein during the step of heating the junctions, the temperature of the sheets remains below the glass transition temperature (T_G) of the respective materials from which the sheets are formed.

18. A method in accordance with claim 13, wherein during the step of heating the junctions, the temperature of the sheets remains below the softening temperature (T_S) of the respective materials from which the sheets are formed.

19. A laminated strength-reinforced window assembly comprising:

a first sheet of transparent material having a tensile strength value, an impact resistance value, an environmental resistance value and a sealing surface;

a second sheet of transparent material having a tensile strength value, an impact resistance value, an environmental resistance value and a sealing surface;

at least one of the tensile strength value, the impact resistance value and the environmental resistance value of the material of the first sheet being significantly greater than the corresponding value of the material of the second sheet;

the sealing surface of the first sheet being disposed against the sealing surface of the second sheet; and

the first and second sheets being hermetically bonded to one another along the sealing surfaces without non-hermetic adhesives to form a continuous hermetic joint therebetween.

20. A laminated strength-reinforced window assembly in accordance with claim 19, wherein the hermetic bond between the sheets is a diffusion bond.